



-1-

SEQUENCE LISTING

RECEIVED

FEB 06 2002

TECH CENTER 1600/2900

<110> Wood, Keith

Hannah, Rita

Moravec, Richard A

<120> IMPROVED METHOD FOR DETECTION OF ATP

<130> 10743/6

<140> US 09/813,279

<141> 2001-03-19

<150> US60/269,526

<151> 2001-02-16

<160> 8

<170> PatentIn version 3.1

<210> 1

<211> 544

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant of LucPpe2 luciferase

<400> 1

Met Ala Asp Lys Asn Ile Leu Tyr Gly Pro Glu Pro Phe Tyr Pro Leu

1	5	10	15
Ala Asp Gly Thr Ala Gly Glu Gln Met Phe Asp Ala Leu Ser Arg Tyr	20	25	30
Ala Asp Ile Ser Gly Cys Ile Ala Leu Thr Asn Ala His Thr Lys Glu	35	40	45
Asn Val Leu Tyr Glu Glu Phe Leu Lys Leu Ser Cys Arg Leu Ala Glu	50	55	60
Ser Phe Lys Lys Tyr Gly Leu Lys Gln Asn Asp Thr Ile Ala Val Cys	65	70	75
Ser Glu Asn Gly Leu Gln Phe Phe Leu Pro Val Ile Ala Ser Leu Tyr	85	90	95
Leu Gly Ile Ile Ala Ala Pro Val Ser Asp Lys Tyr Ile Glu Arg Glu	100	105	110
Leu Ile His Ser Leu Gly Ile Val Lys Pro Arg Ile Ile Phe Cys Ser	115	120	125
Lys Asn Thr Phe Gln Lys Val Leu Asn Val Lys Ser Lys Leu Lys Ser	130	135	140
Val Glu Thr Ile Ile Ile Leu Asp Leu Asn Glu Asp Leu Gly Gly Tyr	145	150	155
Gln Cys Leu Asn Asn Phe Ile Ser Gln Asn Ser Asp Ser Asn Leu Asp	165	170	175
Val Lys Lys Phe Lys Pro Tyr Ser Phe Asn Arg Asp Asp Gln Val Ala	180	185	190
Leu Val Met Phe Ser Ser Gly Thr Thr Gly Val Pro Lys Gly Val Met	195	200	205
Leu Thr His Lys Asn Ile Val Ala Arg Phe Ser Leu Ala Lys Asp Pro	210	215	220
Thr Phe Gly Asn Ala Ile Asn Pro Thr Thr Ala Ile Leu Thr Val Ile	225	230	235
			240

Pro Phe His His Gly Phe Gly Met Met Thr Thr Leu Gly Tyr Phe Thr
245 250 255

Cys Gly Phe Arg Val Val Leu Met His Thr Phe Glu Glu Lys Leu Phe
260 265 270

Leu Gln Ser Leu Gln Asp Tyr Lys Val Glu Ser Thr Leu Leu Val Pro
275 280 285

Thr Leu Met Ala Phe Leu Ala Lys Ser Ala Leu Val Glu Lys Tyr Asp
290 295 300

Leu Ser His Leu Lys Glu Ile Ala Ser Gly Gly Ala Pro Leu Ser Lys
305 310 315 320

Glu Ile Gly Glu Met Val Lys Lys Arg Phe Lys Leu Asn Phe Val Arg
325 330 335

Gln Gly Tyr Gly Leu Thr Glu Thr Thr Ser Ala Val Leu Ile Thr Pro
340 345 350

Lys Gly Asp Ala Arg Pro Gly Ser Thr Gly Lys Ile Val Pro Phe His
355 360 365

Ala Val Lys Val Val Asp Pro Thr Thr Gly Lys Ile Leu Gly Pro Asn
370 375 380

Glu Pro Gly Glu Leu Tyr Phe Lys Gly Ala Met Ile Met Lys Gly Tyr
385 390 395 400

Tyr Asn Asn Glu Glu Ala Thr Lys Ala Ile Ile Asp Asn Asp Gly Trp
405 410 415

Leu Arg Ser Gly Asp Ile Ala Tyr Tyr Asp Asn Asp Gly His Phe Tyr
420 425 430

Ile Val Asp Arg Leu Lys Ser Leu Ile Lys Tyr Lys Gly Tyr Gln Val
435 440 445

Ala Pro Ala Glu Ile Glu Gly Ile Leu Leu Gln His Pro Tyr Ile Val
450 455 460

Ser Glu Asn Gly Leu Gln Phe Phe Leu Pro Val Ile Ala Ser Leu Tyr
85 90 95

Leu Gly Ile Ile Val Ala Pro Val Asn Asp Lys Tyr Ile Glu Arg Glu
100 105 110

Leu Ile His Ser Leu Gly Ile Val Lys Pro Arg Ile Val Phe Cys Ser
115 120 125

Lys Asn Thr Phe Gln Lys Val Leu Asn Val Lys Ser Lys Leu Lys Ser
130 135 140

Ile Glu Thr Ile Ile Ile Leu Asp Leu Asn Glu Asp Leu Gly Gly Tyr
145 150 155 160

Gln Cys Leu Asn Asn Phe Ile Ser Gln Asn Ser Asp Ser Asn Leu Asp
165 170 175

Val Lys Lys Phe Lys Pro Tyr Ser Phe Asn Arg Asp Asp Gln Val Ala
180 185 190

Leu Ile Met Phe Ser Ser Gly Thr Thr Gly Leu Pro Lys Gly Val Met
195 200 205

Leu Thr His Lys Asn Ile Val Ala Arg Phe Ser Leu Ala Lys Asp Pro
210 215 220

Thr Phe Gly Asn Ala Ile Asn Pro Thr Thr Ala Ile Leu Thr Val Ile
225 230 235 240

Pro Phe His His Gly Phe Gly Met Met Thr Thr Leu Gly Tyr Phe Thr
245 250 255

Cys Gly Phe Arg Val Val Leu Met His Thr Phe Glu Glu Lys Leu Phe
260 265 270

Leu Gln Ser Leu Gln Asp Tyr Lys Val Glu Ser Thr Leu Leu Val Pro
275 280 285

Thr Leu Met Ala Phe Leu Ala Lys Ser Ala Leu Val Glu Lys Tyr Asp
290 295 300

Leu Ser His Leu Lys Glu Ile Ala Ser Gly Gly Ala Pro Leu Ser Lys

305	310	315	320
Glu Ile Gly Glu Met Val Lys Lys Arg Phe Lys Leu Asn Phe Val Arg	325	330	335
Gln Gly Tyr Gly Leu Thr Glu Thr Thr Ser Ala Val Leu Ile Thr Pro	340	345	350
Lys Gly Asp Ala Lys Pro Gly Ser Thr Gly Lys Ile Val Pro Phe His	355	360	365
Ala Val Lys Val Val Asp Pro Thr Thr Gly Lys Ile Leu Gly Pro Asn	370	375	380
Glu Pro Gly Glu Leu Tyr Phe Lys Gly Pro Met Ile Met Lys Gly Tyr	385	390	395
Tyr Asn Asn Glu Glu Ala Thr Lys Ala Ile Ile Asp Asn Asp Gly Trp	405	410	415
Leu Arg Ser Gly Asp Ile Ala Tyr Tyr Asp Asn Asp Gly His Phe Tyr	420	425	430
Ile Val Asp Arg Leu Lys Ser Leu Ile Lys Tyr Lys Gly Tyr Gln Val	435	440	445
Ala Pro Ala Glu Ile Glu Gly Ile Leu Leu Gln His Pro Tyr Ile Val	450	455	460
Asp Ala Gly Val Thr Gly Ile Pro Asp Glu Ala Ala Gly Glu Leu Pro	465	470	475
Ala Ala Gly Val Val Val Gln Thr Gly Lys Tyr Leu Asn Glu Gln Ile	485	490	495
Val Gln Asp Tyr Val Ala Ser Gln Val Ser Thr Ala Lys Trp Leu Arg	500	505	510
Gly Gly Val Lys Phe Leu Asp Glu Ile Pro Lys Gly Ser Thr Gly Lys	515	520	525
Ile Asp Arg Lys Val Leu Arg Gln Met Phe Glu Lys His Thr Asn Gly	530	535	540

<210> 3

<211> 544

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant of LucPpe2 luciferase

<400> 3

Met Ala Asp Lys Asn Ile Leu Tyr Gly Pro Glu Pro Phe Tyr Pro Leu
1 5 10 15

Glu Asp Gly Thr Ala Gly Glu Gln Met Phe Asp Ala Leu Ser Arg Tyr
20 25 30

Ala Asp Ile Pro Gly Cys Ile Ala Leu Thr Asn Ala His Thr Lys Glu
35 40 45

Asn Val Leu Tyr Glu Glu Phe Leu Lys Leu Ser Cys Arg Leu Ala Glu
50 55 60

Ser Phe Lys Lys Tyr Gly Leu Lys Gln Asn Asp Thr Ile Ala Val Cys
65 70 75 80

Ser Glu Asn Ser Leu Gln Phe Phe Leu Pro Val Ile Ala Ser Leu Tyr
85 90 95

Leu Gly Ile Ile Val Ala Pro Val Asn Asp Lys Tyr Ile Glu Arg Glu
100 105 110

Leu Ile His Ser Leu Gly Ile Val Lys Pro Arg Ile Val Phe Cys Ser
115 120 125

Lys Asn Thr Phe Gln Lys Val Leu Asn Val Lys Ser Lys Leu Lys Ser
130 135 140

Ile Glu Thr Ile Ile Ile Leu Asp Leu Asn Asp Asp Leu Gly Gly Tyr
145 150 155 160

Gln Cys Leu Asn Asn Phe Ile Ser Gln Asn Ser Asp Ser Asn Leu Asp
165 170 175

Val Lys Lys Phe Lys Pro Tyr Ser Phe Asn Arg Asp Asp Gln Val Ala
180 185 190

Leu Ile Met Phe Ser Ser Gly Thr Thr Gly Leu Pro Lys Gly Val Met
195 200 205

Leu Thr His Lys Asn Ile Val Ala Arg Phe Ser Ile Ala Lys Asp Pro
210 215 220

Thr Phe Gly Asn Ala Ile Asn Pro Thr Ser Ala Ile Leu Thr Val Ile
225 230 235 240

Pro Phe His His Gly Phe Gly Met Met Thr Thr Leu Gly Tyr Phe Thr
245 250 255

Cys Gly Phe Arg Val Val Leu Met His Thr Phe Glu Glu Lys Leu Phe
260 265 270

Leu Gln Ser Leu Gln Asp Tyr Lys Val Glu Ser Thr Leu Leu Val Pro
275 280 285

Thr Leu Met Ala Phe Leu Ala Lys Ser Ala Leu Val Glu Lys Tyr Asp
290 295 300

Leu Ser His Leu Lys Glu Ile Ala Ser Gly Gly Ala Pro Leu Ser Lys
305 310 315 320

Glu Ile Gly Glu Met Val Lys Lys Arg Phe Lys Leu Asn Phe Val Arg
325 330 335

Gln Gly Tyr Gly Leu Thr Glu Thr Thr Ser Ala Val Leu Ile Thr Pro
340 345 350

Lys Gly Asp Ala Lys Pro Gly Ser Thr Gly Lys Ile Val Pro Phe His
355 360 365

Ala Val Lys Val Val Asp Pro Thr Thr Gly Lys Ile Leu Gly Pro Asn
370 375 380

Glu Pro Gly Glu Leu Tyr Phe Lys Gly Pro Met Ile Met Lys Gly Tyr
385 390 395 400

Tyr Asn Asn Glu Glu Ala Thr Lys Ala Ile Ile Asp Asn Asp Gly Trp
405 410 415

Leu Arg Ser Gly Asp Ile Ala Tyr Tyr Asp Asn Asp Gly His Phe Tyr
420 425 430

Ile Val Asp Arg Leu Lys Ser Leu Ile Lys Tyr Lys Gly Tyr Gln Val
435 440 445

Ala Pro Ala Glu Ile Glu Gly Ile Leu Leu Gln His Pro Tyr Ile Val
450 455 460

Asp Ala Gly Val Thr Gly Ile Pro Asp Glu Ala Ala Gly Glu Leu Pro
465 470 475 480

Ala Ala Gly Val Val Val Gln Thr Gly Lys Tyr Leu Asn Glu Gln Ile
485 490 495

Val Gln Asp Tyr Val Ala Ser Gln Val Ser Thr Ala Lys Trp Leu Arg
500 505 510

Gly Gly Val Ile Phe Leu Asp Glu Ile Pro Lys Gly Ser Thr Gly Lys
515 520 525

Ile Asp Arg Lys Val Leu Arg Gln Met Leu Glu Lys His Thr Asn Gly
530 535 540

<210> 4

<211> 544

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant of LucPpe2 luciferase

<400> 4

Met Ala Asp Lys Asn Ile Leu Tyr Gly Pro Glu Pro Phe Tyr Pro Leu

1	5	10	15
Glu Asp Gly Thr Ala Gly Glu Gln Met Phe Asp Ala Leu Ser Arg Tyr	20	25	30
Ala Ala Ile Pro Gly Cys Ile Ala Leu Thr Asn Ala His Thr Lys Glu	35	40	45
Asn Val Leu Tyr Glu Glu Phe Leu Lys Leu Ser Cys Arg Leu Ala Glu	50	55	60
Ser Phe Lys Lys Tyr Gly Leu Lys Gln Asn Asp Thr Ile Ala Val Cys	65	70	75
Ser Glu Asn Ser Leu Gln Phe Phe Leu Pro Val Ile Ala Ser Leu Tyr	85	90	95
Leu Gly Ile Ile Val Ala Pro Val Asn Asp Lys Tyr Ile Glu Arg Glu	100	105	110
Leu Ile His Ser Leu Gly Ile Val Lys Pro Arg Ile Val Phe Cys Ser	115	120	125
Lys Asn Thr Phe Gln Lys Val Leu Asn Val Lys Ser Lys Leu Lys Ser	130	135	140
Ile Glu Thr Ile Ile Ile Leu Asp Leu Asn Glu Asp Leu Gly Gly Tyr	145	150	155
Gln Cys Leu Asn Asn Phe Ile Ser Gln Asn Ser Asp Ser Asn Leu Asp	165	170	175
Val Lys Lys Phe Lys Pro Tyr Ser Phe Asn Arg Asp Asp Gln Val Ala	180	185	190
Ser Ile Met Phe Ser Ser Gly Thr Thr Gly Leu Pro Lys Gly Val Met	195	200	205
Leu Thr His Lys Asn Ile Val Ala Arg Phe Ser Ile Ala Lys Asp Pro	210	215	220
Thr Phe Gly Asn Ala Ile Asn Pro Thr Ser Ala Ile Leu Thr Val Ile	225	230	235
			240

Pro Phe His His Gly Phe Gly Met Met Thr Thr Leu Gly Tyr Phe Thr
245 250 255

Cys Gly Phe Arg Val Val Leu Met His Thr Phe Glu Glu Lys Leu Phe
260 265 270

Leu Gln Ser Leu Gln Asp Tyr Lys Val Glu Ser Thr Leu Leu Val Pro
275 280 285

Thr Leu Met Ala Phe Leu Ala Lys Ser Ala Leu Val Glu Lys Tyr Asp
290 295 300

Leu Ser His Leu Lys Glu Ile Ala Ser Gly Gly Ala Pro Leu Ser Lys
305 310 315 320

Glu Ile Gly Glu Met Val Lys Lys Arg Phe Lys Leu Asn Phe Val Arg
325 330 335

Gln Gly Tyr Gly Leu Thr Glu Thr Thr Ser Ala Val Leu Ile Thr Pro
340 345 350

Lys Gly Asp Ala Lys Pro Gly Ser Thr Gly Lys Ile Val Pro Leu His
355 360 365

Ala Val Lys Val Val Asp Pro Thr Thr Gly Lys Ile Leu Gly Pro Asn
370 375 380

Glu Pro Gly Glu Leu Tyr Phe Lys Gly Pro Met Ile Met Lys Gly Tyr
385 390 395 400

Tyr Asn Asn Glu Glu Ala Thr Lys Ala Ile Ile Asp Asn Asp Gly Trp
405 410 415

Leu Arg Ser Gly Asp Ile Ala Tyr Tyr Asp Asn Asp Gly His Phe Tyr
420 425 430

Ile Val Asp Arg Leu Lys Ser Leu Ile Lys Tyr Lys Gly Tyr Gln Val
435 440 445

Ala Pro Ala Glu Ile Glu Gly Ile Leu Leu Gln His Pro Tyr Ile Val
450 455 460

Asp Ala Gly Val Thr Gly Ile Pro Asp Glu Ala Ala Gly Glu Leu Pro
465 470 475 480

Ala Ala Gly Val Val Val Gln Thr Gly Lys Tyr Leu Asn Glu Gln Ile
485 490 495

Val Gln Asp Tyr Val Ala Ser Gln Val Ser Thr Ala Lys Trp Leu Arg
500 505 510

Gly Gly Val Lys Phe Leu Asp Glu Ile Pro Lys Gly Ser Thr Gly Lys
515 520 525

Ile Asp Arg Lys Val Leu Arg Gln Met Leu Glu Lys His Thr Asn Gly
530 535 540

<210> 5

<211> 1639

<212> DNA

<213> Artificial Sequence

<220>

<223> Mutant of LucPpe2 luciferase

<400> 5

ggatccaatg gcagataaga atattttata tgggcccga ccatTTtata ccttggtga	60
tgggacggct ggagaacaga tgTTtgacgc attatctcgt tatgcagata tttccggatg	120
catagcattg acaaattgctc atacaaaaga aaatgtTTta tatgaagagt ttttaaaatt	180
gtcgtgtcgt ttagcggaaa gttttaaaaa gtatggatta aaacaaaacg acacaatagc	240
ggtgtgtagc gaaaatggtt tgcaatTTtt ccttcctgta attgcatcat tgtatcttgg	300
aataattgca gcacctgtta gtgataaata cattgaacgt gaattaatac acagtcttgg	360
tattgtaaaa ccacgcataa ttttttgctc caagaatact tttcaaaaag tactgaatgt	420
aaaatctaaa ttaaaatctg tagaaactat tattatatta gacttaaatg aagacttagg	480
aggttatcaa tgctcaaca actttatttc tcaaaattcc gatagtaatc tggacgtaaa	540
aaaatttaaa ccatattctt ttaatcgaga cgatcagggt gcgttggtaa tgTTTTcttc	600
tggtacaact ggtgttccga agggagtcct gctaactcac aagaatattg ttgcacgatt	660

ttctcttgca aaagatccta cttttggtta cgcaattaat cccacgacag caattttaac	720
ggtaatacct ttccaccatg gttttggtat gatgaccaca ttaggatact ttacttgtgg	780
attccgagtt gttctaatagc acacgtttga agaaaaacta tttctacaat cattacaaga	840
ttataaagtg gaaagtactt tacttgtacc aacattaatg gcatttcttg caaaaagtgc	900
attagttgaa aagtacgatt tctgcactt aaaagaaatt gcactctggg gcgcacctt	960
atcaaaagaa attggggaga tggtgaaaaa acggttttaa ttaactttg tcaggcaagg	1020
gtagtgatta acagaaacca cttcggtgt ttttaattaca ccgaaagggt acgccagacc	1080
gggatcaact ggtaaaatag taccatttca cgctgttaaa gttgtcgat ctacaacagg	1140
aaaaattttg gggccaaatg aacctggaga attgtatttt aaaggcgcca tgataatgaa	1200
gggttattat aataatgaag aagctactaa agcaattatt gataatgacg gatggttgcg	1260
ctctggtgat attgcttatt atgacaatga tggccatttt tatattgtgg acaggctgaa	1320
gtcattaatt aaatataaag gttatcaggt tgcacctgct gaaattgagg gaatactctt	1380
acaacatccg tatattgttg atgccggcgt tactggtata ccggatgaag ccgcgggcga	1440
gcttccagct gcagggttg tagtacagac tggaaaatat ctaaacgaac aaatcgtaca	1500
agattttgtt tccagtcaag tttcaacagc caaatggcta cgtggtggg tgaaattttt	1560
ggatgaaatt cccaaaggat caactggaaa aattgacaga aaagtgttaa gacaaatgtt	1620
tgaaaaacac accaatggg	1639

<210> 6

<211> 1639

<212> DNA

<213> Artificial Sequence

<220>

<223> Mutant of LucPpe2 luciferase

<400> 6

ggatccaatg gcagataaga atattttata tgggcccgaa ccatttatc ccttggaaga	60
tgggacggct ggagaacaga tgtttgacgc attatctcgt tatgcagata ttccgggctg	120
catagcattg acaaatgctc atacaaaaga aaatgtttta tatgaagagt ttctgaaact	180

gtcgtgctcgt ttagcggaaa gttttaaaaa gtatggatta aaacaaaacg acacaatagc 240
gggtgttagc gaaaatggtc tgcaattttt ccttcctgta attgcatcat tgtatcttgg 300
aataattgtg gcacctgtta acgataaata cattgaacgt gaattaatac acagtcttgg 360
tattgtaaaa ccacgcatag ttttttgctc caagaatact tttcaaaaag tactgaatgt 420
aaaatctaaa ttaaaatcta ttgaaactat tattatatta gacttaaag aagacttagg 480
aggttatcaa tgcctcaaca actttatttc tcaaaattcc gatagtaatc tggacgtaaa 540
aaaatttaaa ccatattctt ttaatcgaga cgatcagggt gcgttgatta tgttttcttc 600
tgggtacaact ggtctgcga agggagtcac gctaaactac aagaatattg ttgcacgatt 660
ttctcttgca aaagatccta cttttggtta cgcaattaat cccacgacag caattttaac 720
ggtaatacct ttccaccatg gtttcggat gatgaccaca ttaggatact ttacttgtgg 780
attccgagtt gttctaattgc acacgtttga agaaaaacta tttctacaat cattacaaga 840
ttataaagtg gaaagtactc cacttgatc aacattaatg gcatttcttg caaaaagtgc 900
attagttgaa aagtacgatt tatcgactt aaaagaaatt gcacttggtg gcgcacctt 960
atcaaaagaa attggggaga tggtgaaaaa acggtttaaa ttaaactttg tcaggcaagg 1020
gtatggatta acagaaacca ctctggctgt tttaattaca ccgaaagggt acgccaacc 1080
gggatcaact ggtaaaatag taccatttca cgctgttaaa gttgtcgatc ctacaacagg 1140
aaaaattttg gggccaaatg aacctggaga attgtatttt aaaggcccga tgataatgaa 1200
gggttattat aataatgaag aagctactaa agcaattatt gataatgacg gatggttgcg 1260
ctctgggtgat attgcttatt atgacaatga tggccatttt tatattgtgg acaggctgaa 1320
gtcactgatt aaatataaag gttatcaggt tgcacctgct gaaattgagg gaatactctt 1380
acaacatccg tatattgttg atgcccgcgt tactggatata ccggatgaag ccgcccgcga 1440
gcttccagct gcagggtgtg tagtacagac tggaaaatat ctaaacgaac aaatcgtaca 1500
agattatggt gccagtcaag tttcaacagc caaatggcta cgtggtgggg tgaaattttt 1560
ggatgaaatt cccaaaggat caactggaaa aattgacaga aaagtgttaa gacaaatggt 1620
tgaaaaacac accaatggg 1639

<210> 7

<211> 1639

<212> DNA

<213> Artificial Sequence

<220>

<223> Mutant of LucPpe2 luciferase

<400> 7

agatccaatg gcagataaga atattttata tggggcccgaa ccattttatc ccttggaaga	60
tgggacggct ggagaacaga tgtttgacgc attatctcgt tatgcagata ttccgggctg	120
catagcattg acaaatgctc atacaaaaga aaatgtttta tatgaagagt ttctgaaact	180
gtcgtgtcgt ttagcggaaa gttttaaaaa gtatggatta aaacaaaacg acacaatagc	240
ggtgtgtagc gaaaatagtc tgcaattttt ccttcctgta attgcatcat tgtatcttgg	300
aataattgtg gcacctgtta acgataaata cattgaacgt gaattaatac acagtcttgg	360
tattgtaaaa ccacgcatag ttttttgctc caagaatact tttcaaaaag tactgaatgt	420
aaaatctaaa ttaaaatcta ttgaaactat tattatatta gacttaaata atgacttagg	480
aggttatcaa tgccctcaaca actttatttc tcaaaattcc gatagtaata tggacgtaaa	540
aaaatttaaa ccatattctt ttaatcgaga cgatcagggt gcgttgatta tgttttcttc	600
tgggtacaact ggtctgccga agggagtcac gctaactcac aagaatattg ttgcacgatt	660
ttctattgca aaagatccta cttttggtta cgcaattaat cccacgtcag caattttaac	720
ggtaatacct ttccaccatg gttttggtat gatgaccaca ttaggatact ttacttgtgg	780
attccgagtt gttctaatac acacgtttga agaaaaacta tttctacaat cattacaaga	840
ttataaagtg gaaagtactt tacttgtacc aacattaatg gcatttcttg caaaaagtgc	900
attagttgaa aagtacgatt tatcgactt aaaagaaatt gcactctggtg gcgcaccttt	960
atcaaaagaa attggggaga tgggtgaaaa acggttttaa ttaaactttg tcaggcaagg	1020
gtatggatta acagaaacca cttcggctgt tttaattaca ccgaaagggtg acgccaacc	1080
gggatcaact ggtaaaatag taccatttca cgctgtttaa gttgtcgatc ctacaacagg	1140
aaaaattttg gggccaaatg aacctggaga attgtatttt aaaggccga tgataatgaa	1200
gggttattat aataatgaag aagctactaa agcaattatt gataatgacg gatggttgcg	1260
ctctggtgat attgcttatt atgacaatga tggccatttt tatattgtgg acaggctgaa	1320
gtcactgatt aaatataaag gttatcaggt tgcacctgct gaaattgagg gaatactctt	1380
acaacatccg tatattgttg atgccggcgt tactggtata ccggatgaag ccgcgggcga	1440

gcttccagct gcaggtggtg tagtacagac tggaaaatat ctaaacgaac aaatcgtaca 1500
 agattatggt gccagtcaag tttcaacagc caaatggcta cgtggtggg tgatattttt 1560
 ggatgaaatt cccaaaggac caactggaaa aattgacaga aaagtgttaa gacaaatgtt 1620
 agaaaaacac accaatggg 1639

<210> 8

<211> 1639

<212> DNA

<213> Artificial Sequence

<220>

<223> Mutant of LucPpe2 luciferase

<400> 8

ggatccaatg gcagataaga atattttata tgggcccga ccatcttata ccttgaaga 60
 tgggacggct ggagaacaga tgtttgacgc attatctcgt tatgcagcta ttccgggctg 120
 catagcattg acaaatgctc atacaaaaga aaatgtttta tatgaagagt ttctgaaact 180
 gtctgtcgt ttagcggaaa gttttaaaaa gtatggatta aaacaaaacg acacaatagc 240
 ggtgtgtagc gaaaatagtc tgcaattttt ccttcctgta attgcatcat tgtatcttgg 300
 aataattgtg gcacctgtta acgataaata cattgaacgt gaattaatac acagtcttgg 360
 tattgtaaaa ccacgcatag ttttttgctc caagaetact tttcaaaaag tactgaatgt 420
 aaaatctaaa ttaaaatcta ttgaaactat tattatatta gacttaaatg aagacttagg 480
 aggttatcaa tgcctcaaca actttatttc tcaaaattcc gatagtaatc tggacgtaaa 540
 aaaatttaaa ccctattctt ttaatcgaga cgatcagggt gcgtcgatta tgttttcttc 600
 tggtaacaact ggtctgccga agggagtcac gctaactcac aagaatattg ttgcacgatt 660
 ttctattgca aaagatccta ctttttggtta cgcaattaat cccacgtcag caattttaac 720
 ggtaataact ttccaccatg gtttttggtat gatgaccaca ttaggatact ttacttgtgg 780
 attccgagtt gttctaattg acacgtttga agaaaaacta tttctacaat cattacaaga 840
 ttataaagtg gaaagtactt tacttgtaac aacattaatg gcatttcttg caaaaagtgc 900
 attagttgaa aagtacgatt tatcgactt aaaagaaatt gcactctgtg gcgcacctt 960
 atcaaaagaa attggggaga tggtgaaaaa acgggtttaa ttaaactttg tcaggcaagg 1020

gtatggatta acagaaacca cttcggtgt ttttaattaca ccgaaaggtg acgccaaacc	1080
gggatcaact ggtaaaatag taccattaca cgctgttaaa gttgtcgatc ctacaacagg	1140
aaaaattttg gggccaaatg aacctggaga attgtatttt aaaggcccgga tgataatgaa	1200
gggttattat aataatgaag aagctactaa agcaattatt gataatgacg gatggttgcg	1260
ctctggtgat attgcttatt atgacaatga tggccatttt tatattgtgg acaggctgaa	1320
gtcactgatt aaatataaag gttatcaggt tgcacctgct gaaattgagg gaatactctt	1380
acaacatccg tatattgttg atgccggcgt tactggtata ccggatgaag ccgcgggcga	1440
gcttccagct gcaggtgttg tagtacagac tggaaaatat ctaaacgaac aaatcgtaca	1500
agattatggt gccagtcaag tttcaacagc caaatggcta cgtggtgggg tgaaattttt	1560
ggatgaaatt cccaaaggat caactggaaa aattgacaga aaagtgttaa gacaaatggt	1620
agaaaaacac accaatggg	1639